

CLAIMS:

1. A phenolic polymer nanotube, comprising a copolymer which includes: at least one monomer selected from a group of phenol and derivative thereof; and at least one aldehyde monomer selected from aldehydes, wherein

the phenolic polymer nanotube has an internal diameter ranging from 1.5 to 5 nm and a thickness ranging from 1.5 to 5 nm.

2. The phenolic polymer nanotube as set forth in claim 1, wherein the thickness ranges from 1.5 to 2.5 nm.

3. The phenolic polymer nanotube as set forth in claim 1, wherein the internal diameter ranges from 1.5 to 2.5 nm, and the thickness ranges from 3 to 5 nm, and at least one of both ends of the phenolic polymer nanotube is closed.

4. The phenolic polymer nanotube as set forth in claim 1, 2, or 3, wherein a length of the phenolic polymer nanotube is 10 nm or more.

5. The phenolic polymer nanotube as set forth in any one of claims 1 to 4, wherein the phenolic polymer nanotube is used as a separation material, an absorption material, or a storage material.

6. The phenolic polymer nanotube as set forth in any one of claims 1 to 4, wherein the phenolic polymer nanotube is used as a microchip separation material for DNA chip or a protein chip.

7. The phenolic polymer nanotube as set forth in any one of

claims 1 to 4, wherein the phenolic polymer nanotube is used as an encapsulation material for isolating reference single-stranded DNAs from each other.

8. The phenolic polymer nanotube as set forth in any one of claims 1 to 4, wherein the phenolic polymer nanotube is used as a precursor of a tubular or fibrous carbon material.

9. The phenolic polymer nanotube as set forth in any one of claims 1 to 4, wherein the phenolic polymer nanotube is used as a molding material for manufacturing an inorganic, metallic, or polymer material whose shape is tubular, wiry, or fibrous.

10. The phenolic polymer nanotube as set forth in any one of claims 1 to 4, wherein the phenolic polymer nanotube is used as an electronic circuit molecular device.

11. The phenolic polymer nanotube as set forth in any one of claims 1 to 4, wherein the phenolic polymer nanotube is used as a fuel battery electrolyte.

12. A method of producing a phenolic polymer nanotube, comprising:

a reaction step in which at least one monomer selected from a group of phenol and derivative thereof is reacted with at least one aldehyde monomer selected from aldehydes in the presence of basic condensing agent;

a treatment step in which a precursor obtained in the reaction step is treated with a strong base; and

a polymerization step in which a reacted precursor obtained in the treatment step is dropped into aqueous solution, containing the monomer and a surfactant selected from a group

of alkyl ammonium salt and alkyl amine, so as to polymerize the reacted precursor.

13. The method as set forth in claim 12, wherein the polymerization is carried out while stirring the aqueous solution in the polymerization step.

14. The method as set forth in claim 12 or 13, wherein the polymerization is carried out while keeping a temperature of the aqueous solution within a range of from 40 to 200°C in the polymerization step.